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(54) Title: FAN IMPELLER WITH INTEGRATED GREASE SEPARATION, ESPECIALLY FOR A COOKING APPLIANCE

FAN IMPELLER WITH INTEGRATED GREASE SEPARATION, ESPECIALLY FOR A COOKING APPLIANCE

Description

The present invention concerns a fan impeller with a base plate and a number of fan impeller blades fastened to the base plate, the fan impeller blades being essentially arranged perpendicular to the base plate and forming an essentially radial arrangement in which each fan impeller blade has a front edge arranged radially outward and essentially perpendicular to the base plate, a rear edge arranged radially inward and essentially perpendicular to the base plate, an outer surface arranged on the delivery side of the fan impeller and an outer surface arranged on the intake side of the fan impeller.

Fan impellers are generally known from the prior art and are used to circulate air. Fan impellers are known in a wide variety of forms, for example, fan impellers with propeller-like blades or with blade-like vanes are known. One problem in fan impellers known from the prior art is that solid and/or liquid particles present in the circulated air can deposit on the vanes of the fan impeller, which leads to soiling of the fan impeller. Undesired distribution of solid and/or liquid particles can also occur from the known fan impellers.

A particular problem is circulation of solid and/or liquid particles, especially in the form of grease particles, when the fan impeller is arranged within a cooking appliance. The fan impeller is generally arranged in a cooking appliance in a fan compartment separated from the cooking space by an air baffle, draws in air from the cooking space and diverts it radially to the enclosing walls in order to create air flow within the cooking appliance from the cooking space into the fan compartment and back again to the cooking space. A heating device or also a heat exchanger is often arranged around the fan impeller so that circulated air is also guided past this heating device or this heat exchanger in order to be heated. During a cooking process grease particles present in the circulated air can then also be guided to the heating device, where they can be burned, which can lead to a reduction in food quality and an odor burden. This is a particular problem if the air is permanently circulated within the cooking appliance by the fan impeller, in which case the solid and/or liquid particles are continuously kept in the gas volume by the circulating flow.

In order to reduce depositing of solid and/or liquid particles circulated by the fan impeller within a cooking appliance, is a device is known from DE 42 06 846 C2 that includes an impact surface or a separation ring around the fan impeller on which a gas flow

prevailing in the gas volume occurs, in which case the solid and/or liquid particles are at least partially separated on impact and can go to a first bypass area.

A fan impeller with a number of radially arranged blades that protrude essentially parallel to the axis of rotation of the fan impeller from a support plate or base plate facing the housing wall of the cooking appliance is also known from DE 43 074 05 C2 in which baffles are arranged at least between some of the blades near the support disk, but with a spacing from it, whose radial outside edges are essentially flush with the outside periphery of the fan impeller, the radial inner edges lie at a spacing from the axis of rotation of the fan impeller and form a nozzle device with the support disk and the two adjacent blades to create a gas stream near the support plate directed radially outward.

A fan impeller is known from US 1,688,345 in which at least one elevation extending away from the base plate is arranged on the outer surface of at least one part of the fan blades.

However, a shortcoming in the devices known from the prior art is that the efficiency of the fan impeller is reduced by the additional devices surrounding the fan impeller or arranged in the fan impeller, since the additional devices represent an obstacle to flow for the circulated air.

The task of the present invention is therefore to modify a generic fan impeller so that the drawbacks of the prior art are overcome. In particular, it is to be prevented that solid and/or liquid particles present in air circulated in a cooking appliance directly reach a heating device or heat exchanger surrounding the fan impeller because of the fan impeller without significantly reducing the efficiency of the fan impeller.

The task of the present invention is solved in that at least one elevation is arranged and/or formed on the outer surface of at least one part of the fan impeller blades, which is spaced from the base plate and extends away from the base plate essentially diagonally from the front edge to the rear edge of the fan impeller blades.

It is then prescribed in particular that the elevation be designed in the form of a step on and/or in the outer surface.

The invention also proposes that the fan impeller blades be curved so that the outer surface curves radially outward between the front edge and the rear edge.

It is advantageous that at least one elevation has a height of about 1 to 10 mm, preferably 2 to 4 mm, at least in areas.

It can also be prescribed according to the invention that at least one elevation has a width from 1 to 10 mm, preferably 2 to 4 mm, at least in areas.

The fan impeller according to the invention is preferably characterized by the fact that the spacing of at least one elevation to the base plate, at least in areas, especially in the region of the front edge, is at least 5 to 25 mm, preferably 10 to 20 mm.

A support element as in the form of a cover ring, of the fan impeller blades on the side of the fan impeller blades opposite the base plate is also proposed with the invention.

It is preferred according to the invention that at least one elevation be designed arc-like at least in areas, in which it is preferably bent from the corresponding rear edge to the corresponding front edge away from the support element.

It is also proposed that at least one elevation forms an angle of 45° to 90° with the front edge, preferably an angle of 70° to 90°.

It is preferred that at least one elevation has at least in areas a spacing to the support element, especially in the region of the rear edge, of at least about 1 to 10 mm, preferably 5 to 15 mm.

It is also preferred that at least one elevation be formed by at least one wire.

It is also proposed with the invention that at least one elevation be welded, at least in areas onto the outer surface of the fan impeller blade.

It can be proposed in particular according to the invention that on the outside surface of at least one fan impeller blade, preferably each fan impeller blade, a distinct edge as in the form of a groove, be formed in the fastening region between the corresponding elevation and the outer surface, at least in areas, on the side lying in the direction of rotation of the fan impeller.

It is advantageously prescribed that at least one elevation have a profiled cross-section at least in areas, be preferably bulged, in which the focal point of the bulge lies on the side of the elevation facing the rear edge, and/or has at least one groove, preferably on the side facing the rear edge.

It is also preferred that at least one elevation be tightly joined preferably with silicon to the outer surface, at least in areas, on the side facing away from the direction of rotation of the fan impeller.

The fan impeller according to the invention can be arranged in a cooking appliance.

The basis of the present invention is the surprising finding that by elevations on the outer surface of the fan impeller blades on a base plate, a situation in which solid and/or liquid particles contained in the circulated air, especially in the form of grease particles, are diverted radially by the fan impeller is avoided. Instead, solid and/or liquid particles that strike the outer surfaces of the fan impeller blades are stopped on the elevation and diverted in the direction toward the base plate by the special geometry of the elevation. In the region of the base plate the solid and/or liquid particles can then be released from the fan impeller blades without striking devices that are arranged radially around the fan impeller, for example, a heating device within a cooking appliance.

Since the solid and/or liquid particles are not released by the fan impeller blades directly to the devices radially surrounding the fan impeller, like a heating device, a situation is prevented in which grease particles in particular can be burned on the heating device, which could lead to a reduction in food quality and an odor burden.

On the other hand, because of the fan impeller according to the invention, a situation is surprisingly achieved in which the efficiency of the fan impeller is not significantly compromised, since no large obstacles are arranged in the radial flow path of the circulated air. In addition, the elevations arranged on the outsides of the fan impeller blades ensure additional stability of the fan impeller blades themselves.

Additional features and advantages of the invention are apparent from the following description, in which a practical example of the invention is described in detail by means of a drawing consisting of a single figure. The figure shows a perspective view of a fan impeller according to the invention.

The figure shows a perspective view of a fan impeller 1 according to the invention that can be incorporated in a fan compartment of a partially depicted cooking appliance in order to circulate air rotating in the direction of arrow A in a cooking space that is separated in areas from the fan compartment by an air baffle (not shown). The fan impeller 1 has a base plate 2, on which a number of fan impeller blades 3 are arranged, which face the cooking space of the cooking appliance. The fan impeller blades 3 are curved and arranged essentially perpendicular to the base plate 2 in order to form an essentially radial arrangement

on base plate 2. Each fan impeller blade 3 during operation has a rear edge 5 that comes in contact first with the circulating air and an outer surface 6 arranged on the delivery side fan impeller 1 during operation. An elevation 7 is also provided on the outer surface 6 of a fan impeller blade 3, which extends away from base plate 2 essentially diagonally from one front edge 4 to rear edge 5 of the fan impeller blade 3. The elevation 7 is then arranged with a spacing from 10 to 20 mm from base plate 2 on the outer surface 6. The elevation 7 can extend completely over the entire width of fan impeller blade 3 or have a spacing to the side of the fan impeller blade 3 opposite base plate 2, in which the spacing is preferably 5 to 15 mm. On the side of fan impeller blade 1 opposite base plate 2 a cover ring 8 is provided, which ensures additional stabilization of the fan impeller blades 3 within the fan impeller 1. The elevation 7 should rise from the outer surface 6 of the fan impeller blade 3 by 2 to 5 mm and end with a sharp edge on the rear edge 5 of fan impeller blade 3 on the end facing the air flow in order to form a discharge groove for solid and/or liquid particles, which prevents further flow of the solid and/or liquid particles beyond elevation 7 and guides them in the direction of base plate 2. In addition, sealing can be provided on the side lying in the flow shadow between the outer surface 6 and elevation 7.

This sealing can occur, for example, with silicone, but any other sealing can be provided that is obvious to one skilled in the art in this field.

The method of operation of the impeller blade 1 according to the invention is described below.

The impeller blade 1 is rotated in the fan compartment in the direction of arrow A via a motor not shown in the figure, and therefore draws in air from the cooking space through a center opening in the air baffle and guides it radially outward so that it goes back to the cooking space from the fan compartment via the air baffles. Solid and/or liquid particles, especially grease particles of different size, that reach the region of fan impeller 1, strike the outer surfaces 6 of fan impeller blades 3 on the delivery side of the fan impeller and are diverted along elevation 7 in the direction toward base plate 2. If the solid and/or liquid particles reach the end region of elevation 7 on the front edge 4 of fan impeller blades 3 (and finally the base plate 2), the solid and/or liquid particles released at that point cannot be released directly to the device radially surrounding the fan impeller 1, for example, in the form of a heating device (not shown) or a heat exchanger (not shown). Because of this "leading" of the solid and/or liquid particles past a heating device and/or a heat exchanger, their burning is prevented, which can lead to an odor burden and a negative effect on the cooking result. Instead, the separated solid and/or liquid particles can be disposed of.

The fan impeller according to the invention in a cooking appliance therefore prevents solid and/or liquid particles from being deposited directly on a heating device enclosing the fan impeller and also ensures that air circulated by the fan impeller 1 can be diverted completely radially, since the efficiency of the fan impeller 1 is only slightly reduced by the elevation 7. The fan impeller 1 acquires higher stability because of the elevations 7.

List of reference numbers

1 Fan impeller
2 Base plate
3 Fan impeller blade
4 Front edge
5 Rear edge
6 Outer surface
7 Elevation
8 Cover ring
A Direction of rotation